

# FINAL REPORT

March 1, 1996 to August 31, 1999

## A New High Mass, High Sensitivity, High Resolution Ion Chromatography Instrument

AFOSR Grant F49620-98-1-0195

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### I. Abstract/Status

The design of a complex instrument intended to probe the generation, structure and reactivity of a wide variety of new material types has been completed. The instrument is composed of a laser desorption ion source, a combination linear/reflectron time of flight mass analyzer, a novel high resolution ion mobility/reactivity cell and a 4000 amu quadrupole mass filter. Construction of the instrument is underway with completion expected in Spring, 2000. This instrument will support research funded under AFOSR Grant F49620-99-1-0048.

### II. Objectives

Design and construction of a novel, state-of-the-art instrument to probe the generation, structure and reactivity of a wide class of new materials.

### III. Progress/Accomplishments

The instrument has been designed and construction is underway. The instrument eventually will have a number of novel ion sources but we will begin with combination laser desorption/MALDI source. Since there are so many novel aspects of the rest of the design we expect a larger than usual period of initial testing experiments and wanted a dependable ion source during this period. We will add a molecular beam source and electrospray source in due course.

The time-of-flight front end is both a reflectron version for high resolution analysis of the source material and a linear version for mass selected injection into the mobility cell. The mobility cell is a completely new design, 20 cm in length, with high transmission screens 1 cm from the inlet and exit holes. The mobility will be measured between the two screens. The initial 1 cm of the cell will be useful in removing penetration effects and the final cm will allow refocusing of the ion cloud on the exit hole. An annular glass shroud with an interior copper maze will allow temperature variation from 80 to 800 K. This should be both a high resolution and high transmission cell. Finally, a 4000 amu quadrupole mass filter following the mobility cell will be used in reaction studies and to confirm no chemistry occurred in mobility studies.

**IV. Papers Published or Submitted for Publication**

None to date.

**V. Personnel Supported**

**A. Senior**

Dr. Paul Kemper

**VI. Papers Presented**

None to date

**VII. Honors and Awards**

See Final Report for "Cluster Ions" AFOSR Grant F49620-96-1-0033

**VIII. Transitions**

Work continues in collaboration with the group at ICI Ltd.

**IX. New Discoveries, Inventions or Patent Disclosures**

None to date.

## REPORT DOCUMENTATION PAGE

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